business topics

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CURRICULUM WORKSHOP IN ECONOMIC EDUCATION

COLLEGE OF EDUCATION
August 5 - 16, 1957
Director: LEONARD LUKER,
Department of Teacher Education

The Ninth Annual Workshop in Economic Education for 1957 was changed to a Curriculum Workshop in Economic Education in the College of Education. Members of the Board of Trustees of the Michigan Council on Economic Education and members of the State Curriculum Committee on Economic Education recommended that an opportunity be provided for a limited number of former workshop members to develop curriculum materials in the area of economic education. Scholarships were provided for 15 participants.

Products of the workshop include (1) a scope chart covering the broad content of economic education, (2) a plan for using the scope as an inventory, (3) tentative grade placement, (4) a glossary of economic terms and concepts, (5) materials and resource helps, (6) an orientation guide for in-service programs for teachers, (7) an outline for a guide to a community-school program in economic education, (8) a statement concerning need for economic education, and (9) recommendations for continuation and extension of these projects. In addition, suggestions were given for further development of the economic education program in Michigan.

Resource persons included Russell Darling, Consumer Finance, Lansing; Theral Herrick, Curriculum and Guidance, Kalamazoo; Mills Wilber, Department of Public Instruction, Lansing; Marcellene Barnes, Curriculum and Instruction, Grand Rapids; Gordon Holmgren, Elementary Curriculum, East Lansing; Robert Koopman, Department of Public Instruction, Lansing: Edward Allen, Joint Council on Economic Education, New York; and members of the Board of Trustees of the Michigan Council on Economic Education.

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"Let your discourse with men of business be short and comprehensive."

(George Washington's *Copybook*).

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WHAT TOP MANAGEMENT EXPECTS OF INDUSTRIAL RELATIONS EXECUTIVES

*By W. F. POUPARD**

The combination of personal traits and special training that make a good industrial relations expert is the subject of this discussion from management's point of view.

The industrial relations executive today covers a much wider variety of responsibility than his counterpart of twenty years ago or more. In those days this person was known as the personnel manager, or the employment manager—properly so, because his main function was to recruit and hire employees. But today the industrial relations executive has many company-wide responsibilities. Most factories today have unions representing the majority of their employees. Local, state, and federal laws affecting employment are far more complicated. Beyond this, we are more fully aware that human relations are important. We have discovered that participation, motivation, and communication play a vital part in our work lives.

When executives are asked what they expect of their fellow executives, their replies include expectations that their executives be honest, loyal, ambitious, aggressive, and young, but with many years of experience in their particular field. They also want a full understanding of company policies and practices. When we combine these prerequisites with those that go with a particular field, we find that additional special requirements are expected of the executive. For instance, the controller must have accounting experience; the tool engineer must have engineering experience; the production chief must have a background of experience in production.

Today the industrial relations executive must *know*, not just *understand*, the intimate details of a long list of items relative to his specialized field. Such an executive not only has the responsibility for administering a large number of programs and practices, but most of them must be negotiated with the union for inclusion in union-management contracts. A brief look at the responsibilities included in the jurisdiction of industrial relations directors shows that such things as vacations, holidays, leaves of absence, call-in pay, union elections, grievance procedures, seniority, pensions, and all forms of insurance, constitute only a few of the every-day problems of an industrial relations director. He must also administer programs concerning employee attitudes, job evaluation, personnel selection, recruitment, and placement, medical examinations, apprentice and worker training, and incentive systems. In addition, most industrial relations directors find themselves with employment laws, labor laws, social security problems, cost-of-living adjustments, improvement factors, suggestion systems, blood banks, supplemental unemployment benefits, service awards, unemployment compensation, and workmen's compensation. All these constitute only part of the areas of responsibility which now face the modern industrial relations executive.

It is the industrial relations executive's responsibility to carry out all his duties with the utmost discretion, promptness, and with the company's best interest at heart. Thus it follows that the industrial relations executive should have such qualifications as a keen personal interest

*Mr. Poupard is Works Manager of the Kelvinator Division of American Motors, Incorporated, in Detroit. This article was presented at the Seminar on New Perspectives in the Management of Industrial Relations, presented by the Labor and Industrial Relations Center, MSU, December 12, 1956.

in human beings, and he should possess an acute awareness of his obligations to his superiors and subordinates. He should possess tact and diplomacy together with honesty, common sense, and good judgment.

Because of the very nature of his job, he should be well-versed in the basic principles underlying the various functions which he is charged with administering. In addition, he should be very familiar with the workable policies which have been established by other companies and be able to apply such policies to the needs of his own company when appropriate and desirable. The mere fact that the industrial relations executive is a manager of a particular specialized activity indicates that he should possess the qualities of a leader and manager, and all that such leadership entails.

It is difficult to write specifications which will adequately cover all the qualifications needed by the industrial relations executive. However, the following suggestions should be helpful:

1. Will the person be able to contribute in a real way to the management of the business?
2. Does he have the ability to improve the personnel of the company?
3. If there is a union will he be capable of maintaining harmonious relationships with the stewards and officers?
4. Will he acquire as much knowledge about the affairs of his department in regard to personnel and industrial relations as he should?
5. Is he the kind of person who will study regularly in order to keep up to date on what is going on in his field?

Among the many responsibilities of the industrial relations executive, I believe I would rate the following four as the most important functions, but not necessarily in the order given:

1. *Communications*—the central idea of communications is to convey the aims and ambitions of the company to the employees. This can be accomplished in various ways—person to person contacts, letter writing house organs, and through supervisors. Of these, person to person contacts for most purposes are extremely important.
2. *Contract adherence*—this means that the industrial relations director should be able to follow the contract as it is agreed upon. This is sometime the most difficult function for the industrial relations executive but it is imperative that the contract be followed precisely. In particular, the part of the agreement most important in this respect is that which relate to the grievance procedure. This item requires the most discretion, diplomacy, and tact on the part of the supervisor, industrial relations executive, and management, because here we are dealing with the most delicate type of problem. The person aggrieved must be answered honestly with sincerity, and most importantly, he must be convinced. This can best be handled by his supervisor, who should therefore be trained in diplomatic methods of working with people.
3. *Supervisory training*—I believe this is more important today than ever before. Years ago a supervisor was considered an outstanding supervisor if he knew how to operate a machine better than his fellow workers. Today this prerequisite is still important, but it is very important that the supervisor understand the company-union contract, human behavior, etc. These new prerequisites have become the responsibilities of the supervisor, and it is up to the industrial relations director to help him carry them out.

Contract negotiations—This responsibility calls for all the adjectives in the book to describe, but nevertheless when you get right down to the problem it is the one that requires the best possible salesmanship. Here is where the industrial relations executive reminds me a great deal of a poker player. In a hand of showdown, the value of the different combinations of cards is based on mathematical probabilities. A different complexion, however, is put on the game when each player conceals his hand. It is true that in the end if all the players remain in the game the winner will be based on the mathematical probabilities. The human factor, however, is now important. As the cards are dealt and the betting proceeds, the various players use their wit, role playing, facial expressions, and various forms of deportment to dissuade their fellow players from continuing in the game, each with the hope that in his particular way he will end up the winner. The mathematical value still holds but the results are made different by the humans involved.

In conclusion, management suspects that the industrial relations executive is overpaid and underworked and the industrial relations executive suspects that he is overworked and underpaid and in this respect there is a strong similarity among all executives.

Reading is sometimes an ingenious device for avoiding thought.

Sir Arthur Helps, *Friends in Council*

The condition of man . . . is a condition of war of everyone against everyone.

Thomas Hobbes, *Leviathan*

It is the province of knowledge to speak, and it is the privilege of wisdom to listen.

Oliver Wendell Holmes, The Professor at the Breakfast Table

TOWARD THE ST. LAWRENCE SEAWAY, 1821.

(The reviewer is discussing the future of the steamboat.)

Admirable as this ingenious contrivance is upon all waters, there are none to which it is so peculiarly fitted, as to our inland seas and the two great channels, by which they communicate with the Atlantic, — the St. Lawrence and the Mississippi. It has already contributed greatly to the late rapid increase of population in the parts of the country bordering on these waters, and will doubtless contribute still more to the same effect hereafter. It matters not what the distance between two points on the earth's surface is, if there be an easy and certain mode of communication from one to the other, and such a communication is now afforded by steam boats, wherever there is water for them to move in . . . Detroit, for example which was formerly a half year's journey from our own metropolis [Boston] is now a mere pleasant excursion.

North American Review XV, 1821, p 232.

CHEMICALS AND CONCRETE

*By M. JACK SNYDER and NILES G. FOSS**

Chemical additions are helping to make concrete an increasingly versatile material with new potential applications. The increasing demand for the material, along with research, is opening new marketing opportunities for chemical producers.

The average American citizen is surrounded by concrete from the day he is born in a reinforced-concrete hospital until he is buried perhaps in a concrete grave vault. The house in which he lives is built on a foundation of concrete or concrete blocks, perhaps even its exterior is covered with a type of concrete called stucco. The water he drinks probably flowed through a concrete pipe sometime in its journey to his glass. Much of the food and beverages he consumes was processed in a cannery, dairy, brewery, or distillery built of sanitary concrete. When he leaves his house for work, he travels on concrete porches, steps, sidewalks, driveways, streets, highways, bridges, and tunnels. His office is probably in a reinforced-concrete building. On week ends, he relaxes in a concrete swimming pool or attends a sporting event or concert seated in a concrete stadium or auditorium.

The two major industries that supply the raw materials for concrete, portland cement and aggregate, are sizable industries. In the United States during 1955, approximately 55 million tons of portland cement valued at nearly $800 million was produced. About 250 million tons of sand, gravel, limestone, and slag, having a value of around $250 million, was added to make about two million cubic yards of concrete valued at nearly $3 billion in place. The production of cement for 1955 represents a nearly three-fold increase over 10 years ago. This rate of growth is expected to continue at least through 1959.

During 1953—the latest year for which complete data on raw materials are available—the Bureau of Mines reported that almost 85 million tons of raw materials entered into the manufacture of 50 million tons of portland cement in the United States.

Many industries play vital parts in the production of cement, while many additional industries are concerned with the use of cement and concrete. The ready-mix concrete, concrete block, and concrete pipe industries owe their existence to this material. Tremendous quantities of concrete are used every day by the contracting firms that build our houses, buildings, highways, bridges, and dams. The manufacturers of machinery for mixing, transporting, placing, and finishing cast-in-place concrete structures, and for forming and curing precast concrete objects have a vital interest in concrete.

Although the chemical industry provides materials that comprise an essential part of much of the concrete used, the connection between the chemical and concrete industries is less obvious to the casual observer than is the case with most of the other industries mentioned. Concrete is a versatile material in itself, but the addition of relatively small amounts of chemicals to concrete greatly increases the number of uses to which it can be put.

Chemicals in Concrete

Cement and concrete technologists make a distinction between chemicals added to cement by the cement manufacturers and chemicals added to concrete at the mixer or job site. When chemicals are added during the manufacture of the cement, they are called "additions"; when they are added to the

*The authors are associated with market & materials research at Battelle Memorial Institute, Columbus, Ohio. This article is reprinted from *Battelle Technical Review*, July, 1957. Mr. Foss is a 1951 Michigan State University Graduate in Economics.

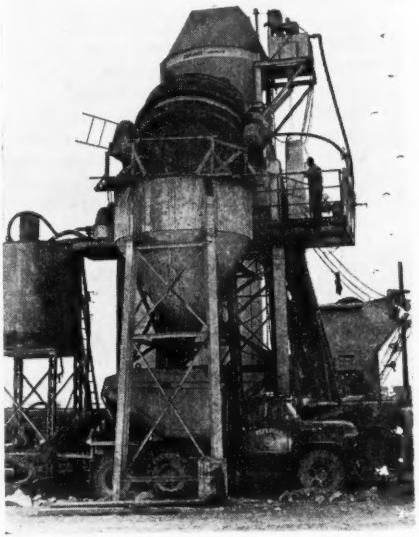
concrete at the mixer, they are known as "admixtures". For most purposes, the end result is the same. For simplicity, therefore, we shall use the term "addition" to cover either case.

The use of chemicals to alter the properties of cement and concrete is as old as the use of cement itself. The ancient Romans added blood, lard, and milk to their possolanic concretes, probably to improve the ease with which the concrete could be placed. Although it is unlikely that the Romans were aware of it, blood is an air-entraining agent and undoubtedly improved the durability of the Roman concretes. Little is known of concrete practice during the Dark Ages, but it is reasonable to assume that men were busy mixing various materials with concrete in an effort to improve workability and performance.

In the U. S. until relatively recent times, additions to concrete were generally regarded with suspicion because of unfortunate experiences with addition agents that had not been evaluated thoroughly. The finding that air-entrainment greatly improved the resistance of concrete to the destructive forces of freezing and thawing led to a widespread change of opinion about the merits of adding chemicals to concrete and it is now generally agreed that additions, when used with discrimination, are an essential ingredient of concrete.

Accelerators and Retarders

Practically all portland cement contains gypsum, $CaSO_4 \cdot 2H_2O$, as a retarder to bring the setting time within the limits required by A.S.T.M. and Federal Specifications. Although the setting time can be varied by making appropriate changes in the cement composition and the fineness of grinding, the demand for cements having setting characteristics different from standard cement is not generally sufficient to justify manufacturing special grades. Exceptions include "high-early" cement which is finer ground than ordinary cement and certain oil-well cements in which the chemical composition is regulated to provide extremely slow setting. Ordinarily, chemicals are added to the concrete at the mixer, when it is desired to shorten or lengthen the time over which concrete will remain workable after mixing, or to vary the rate of strength development.



A central concrete mixing plant for use on large projects; it produces 20 to 25 batches per hour. The operator at the control panel adjusts the amount of water and air-entraining agents that are added to the proportioned cement and aggregates mixed in the batcher at the rear.

(Courtesy of Portland Cement Association)

The most widely used set accelerator is calcium chloride. It may be added as such to the concrete or as an ingredient in a proprietary admixture. When concreting operations must be done in the winter, calcium chloride is usually added to obtain normal strength development. Triethanolamine is used to a lesser ex-

SUMMARY OF THE MAJOR CHEMICALS USED WITH CONCRETE

Type of Chemical	*Primary Purpose*	*Specific Chemicals*
Accelerators and Retarders	Shorten or lengthen the time over which concrete will remain workable after mixing, or to vary the rate of strength development	Gypsum Calcium chloride Triethanolamine Soluble silicate Fluosilicates Copper sulfate Sodium phosphate Boron compounds Sodium bicarbonate Various starches and sugars Hydroxy acids Calcium lignosulfonate Carbohydrate salts
Air-Entrainment Agents	Reduce damage to concrete caused by freezing and thawing and by attack by ice-removing salts	Alcohol sulfates Alkyl sulfonates Resin soaps Saponin Casein
"Waterproofing" and Water Resistant Agents	Prevent transfer of moisture through concrete structure	Metallic soaps Asphalt emulsions Silicones Calcium stearate
Plasticizers	Provide better resiliency and tensile strength for concrete	Asphalt emulsions Polyvinyl acetate Rubber latex
Fungicidal Additives	Lessen the deterioration of concrete by inhibiting the growth of bacteria and fungi	Copper oxychloride Copper acetoarsenate Copper oxides Pentachlorophenol
Curing Compounds	Develop better strength of the concrete by retarding water evaporation in the mixture during the curing stage	Paraffin Petrolatum Microcrystalline wax Cumar and terpene resins Calcium chloride
Surface Sealers	Reduce dust accumulation by hardening surface of the concrete	Sodium silicate Fluoride salts Linseed oil

tent as a set accelerator in ordinary concreting operations. For special applications such as sealing leaks in hydraulic structures where an extremely fast set is required, soluble silicates and fluosilicates or aluminous cements may be used. However, undesirable side effects such as poor durability, execessive heat generation, or low ultimate strength often are associated with very rapid setting.

There are many more chemicals that retard than accelerate the set of cement. Retardation is often needed in hot weather, in situations where placement of the

concrete is difficult and the concrete must remain workable for long periods of time, in cementing deep oil wells, or in repairing or solidifying porous structures by pumping cement grout into fissures, cracks, and pores. Although most retarders are organic compounds, many inorganic compounds are also effective. Gypsum is, of course, the most common retarder, being present in practically all cement. Other inorganic chemicals that have been found useful include copper sulfate; sodium phosphates, particularly sodium hexametaphosphate; boron compounds such as calcium borate, borax, and boric acid; and sodium bicarbonate.

Many organic compounds also retard the set of cement. These fall into three general classes: (1) starches or cellulose products, e.g. dextrins, flours, carboxymethyl cellulose, hydroxyethyl cellulose, lignosulfonic acid and its salts; (2) sugars; and (3) hydroxy acids or their salts, e.g. tannic, gallic, tartaric, citric acids. Most of the proprietary retarding agents contain calcium lignosulfonate as the active ingredient. The humic acid in some soils retards the set sufficiently that stabilization of the soil with cement is not possible.

Improving Workability

As any "Do-It-Yourself" fans knows from hand-blistering experience, concrete is a heavy and difficult-to-move material. When concrete does not flow into corners and around reinforcing rods as easily as desired, the normal inclination even among experienced concrete workers is to add more water to the concrete. This practice posed a difficult problem for the men who design and specify concrete mixes. Generally speaking, the less water used, the better the concrete. However, chemists recently have come to the rescue of the concrete designer with a variety of chemicals that enable the working characteristics of concrete to be improved without sacrificing strength, impermeability, or durability through addition of water beyond the design limits. These chemical aids are particularly helpful where the concrete is harsh because of aggregate characteristics or grading, when the concrete must be placed around closely spaced reinforcement, in locations difficult of accessibility, or where special means of placement such as pumping are required.

The most important of the chemical agents for improving workability are sulfonated organic compounds and carbohydrate salts. Examples include salts of lignin sulfonic and naphthalene sulfonic acid, tartaric acid, citric acid, saccharic acid, and tetrahydroxyadipic acid. Many of these chemicals also function as set retarders, and proprietary agents for improving workability often include calcium chloride or triethanolamine to overcome the retarding effect.

Another method of improving workability utilizes chemicals of the type that are familiar to all of us as ingredients of synthetic detergents. These chemicals result in the incorporation of small air bubbles in the concrete which serve to "lubricate" the aggregate and increase the fluidity of the concrete. Entrainment of air produces other results that are desirable for certain applications, so that the improved workability may be a bonus.

Air-Entraining Agents

The householder, who uses salt or calcium chloride to melt ice from his concrete sidewalk in winter, learns from first-hand experience how destructive ice-removing salts can be unless he is one of those few fortunate individuals whose sidewalks were made with concrete containing an air-entraining agent. The destruction of concrete highways by freezing and thawing and the added attack by ice-removing salts was at one time an extremely serious problem in northern United States. The widespread use of air-entraining agents in paving concrete within the last 15 years has almost eliminated the problem except in those few cases where the conditions are extremely severe.

Although a great variety of surface-active agents are effective air-entraining agents, for economic reason, the agents being used are confined primarily to low-

priced derivatives of natural materials. Soaps of natural wood resins and fats, sulfonated oils, and neutralized tall oil are the most commonly used. In addition to their use in cast-in-place concrete such as highways, air-entraining agents have proved to be valuable in precast concrete products. Use of such agents in the manufacture of concrete block results in greater compaction and consequently denser block, improved appearance because of sharp edges and corners, and lowered absorption. The decreased breakage in green block is of great economic importance. Air-entraining agents in concrete pipe mixes results in better flow of the concrete around reinforcing, easier mold stripping, better appearance, and less permeability.

In paving concretes, the type of air-entraining agent and the quantity used is chosen carefully to provide an entrained air content of about three to six per cent by volume.

Foaming and Gassing Methods and Agents

By changing the agent, the amount used, or the mixing equipment, larger amounts of air can be entrained to produce a porous, lightweight concrete. The foaming agents used include detergent-type chemicals such as the alcohol sulfates, alkyl sulfonates, or alkyl aryl sulfonates, and derivatives of natural materials such as resin soaps, saponin, or hydrolized proteins. Casein, glue, starch or hydrolized cellulose products often are added as stabilizing agents.

The density of ordinary concrete is about 150 pounds per cubic foot. Foamed concrete can be produced with density as low as 10-20 pounds per cubic foot. The extremely lightweight concretes have very low strengths and generally are useful only as insulating fill material. Moderately lightweight concretes (60 to 90 pounds per cubic foot) have sufficient strength for use as flooring and roof deck materials, and are finding increasing acceptance in modern building practice. The decrease in the dead-load that can be achieved with lightweight concrete provides the possibility of considerable saving in the amount of supporting steel required.

Another method of producing lightweight concrete is by incorporating a gas other than air in the concrete by means of a chemical reaction that liberates the gas within the concrete. Powdered aluminum metal is the most commonly used gassing agent. After the aluminum powder is added to the concrete and mixed for a short period, sodium hydroxide is added, followed by a final short mixing period before the concrete is cast. The aluminum powder and sodium hydroxide react to liberate hydrogen gas, whereupon the concrete expands and rises like a loaf of bread. In some cases, where lime is used as an ingredient in the mix, the sodium hydroxide is not needed. Mixtures of hydrogen peroxide and calcium hypochlorite have been used similarly to liberate oxygen as the cell-forming gas. Because of the careful control needed in producing a lightweight concrete by the gas-generation process, this method is used primarily in making precast concrete units, whereas cast-in-place cellular concrete usually is made by foaming. Research on cellular concrete products cured by high-pressure steam has demonstrated that lightweight concrete products having high strengths can be obtained in this fashion. Commercialization of the laboratory findings undoubtedly will open still wider markets for lightweight concrete and the chemicals used in producing it.

Waterproofing

Many arguments have raged over the subject of waterproofing concrete. Much of the argument has been due to semantic difficulties about the term "waterproofing". Water passes through concrete by two different processes. In one, water under pressure is forced through either relatively large or small channels connecting the inner and outer faces of the concrete — the cause of most leaky basement walls after a heavy rain. In the second process, water passes through

the concrete by action of capillary forces in the absence of any appreciable water pressure. This process can result in a damp basement by transfer of moisture from earth in contact with the outside surface, even though the wall is free from cracks and shows no visible signs of leaking.

To avoid the confusion inherent in using the term waterproofing, more precise terminology has been adopted generally. Prevention of moisture transfer by flow under pressure through channels within the concrete is referred to as "permeability reduction". Prevention of capillary transfer of moisture is called "damp proofing".

Many concrete technologists assert that a properly designed mix, placed and cured according to specifications, is completely impermeable to water and is in no need of a permeability reducing addition. Others assert that concrete is not always designed, placed, and cured properly and that water-reducing additions will help insure a dense, impermeable concrete. It is generally agreed that addition of many oils, fats, metallic soaps, asphalt emulsions, or certain silicones to concrete make it initially water-repellent and retard capillary transmission of moisture. There is some disagreement, however, as to the permanency of the damp-proofing thus obtained.

The major use of damp-proofing additions has been in masonry mortars and in cement-base paints for application over the interiors of concrete foundations and as an exterior coating over various kinds of masonry construction. Calcium stearate is the most common addition as it can be readily added by the cement manufacturers or by a compounder of cement-base paints. Recently, a dry silicone powder has been offered for this application. Liquid materials such as asphalt emulsions or butyl stearate emulsions have the disadvantage that they must be packaged separately and be added as a separate ingredient by the consumer.

Reducing Brittleness

The major deficiency of concrete as a construction material is that it is brittle. It is lacking in resiliency and extensibility, and has low tensile strength. An obvious approach to remedy this deficiency is to incorporate a plastic or rubbery material in the concrete. Asphalt emulsions, polyvinyl acetate emulsions, and rubber latex emulsions have been added to concrete for this purpose. Although laboratory tests have shown that such additions do improve the resiliency, increase the tensile strength and the elongation on tensile stressing, increase resistance to cracking, and in many situations improve the chemical resistance of concrete, few data are available on the performance in actual service.

The major drawback to extensive use of plastic and rubber emulsions in concrete is their cost. With cement selling for about one cent per pound and aggregate selling for even less, it is not economically practical to add much of a material costing 30 to 50 cents per pound to concrete. In some applications, the advantages to be gained by the addition of plastics or rubber to concrete may balance the increased cost. Thus, some use is being made of the materials in floor topping mixes, tank linings, patching mixes, mortars, and stucco. If these special mixes live up to their predicted performance, the market will increase appreciably.

Fungicidal Additions

Deterioration of concrete floors is a recurring problem in food-processing plants, dairies, and breweries. The primary cause of such deterioration appears to be bacterial or fungus attack on spilled materials resulting in acidic products that weaken or dissolve the cement. Several chemicals have been added to cement and concrete in an attempt to inhibit the growth of bacteria and fungi. Copper compounds such as copper oxychloride, copper acetoarsenate, and copper oxides, and fungicidal organic compounds such as pentachlorophenol have been found effective in the laboratory. Limited serv-

ice experience indicates that such additions are effective in actual practice. In addition to their use in food-processing plants, fungicidal or antibacterial concretes have been used in shower-room floors, gymnasium floors, locker-room floors, swimming pools, cafeteria floors, and hospital floors. The problems of slime and fungus growth in piping and fluid transmission lines, particularly in the paper and textile industries, offer a potential outlet for such concretes.

Chemicals on Concrete

The treatment of concrete objects with chemicals for any purpose other than a purely decorative one is a relatively recent development. The aim in chemically treating a concrete surface ordinarily is to improve its resistance to some agent or force. A notable exception to this generalization is the use of chemicals on fresh concrete as a curing aid.

Curing Compounds

The reaction by which concrete hardens and develops strength is hydration, and sufficient water must be provided to insure that the reaction goes to completion. The amount of water which must be added to cement and aggregate to make a workable concrete, even with a water-reducing agent present, is well above the minimum amount required for hydration. The only problem then is to keep the water within the concrete where it is available for reaction. The time-honored method of maintaining the water content at the required level is to replace the water lost by evaporation by spraying or ponding water over the concrete or covering it with moist burlap, straw, sand, or earth. For best results, the concrete should be kept moist in this way for several days. Because of the high labor costs associated with the conventional wet-curing methods and the ever present risk that someone will forget to water the concrete, an easier, cheaper, "one-shot" curing method is desirable.

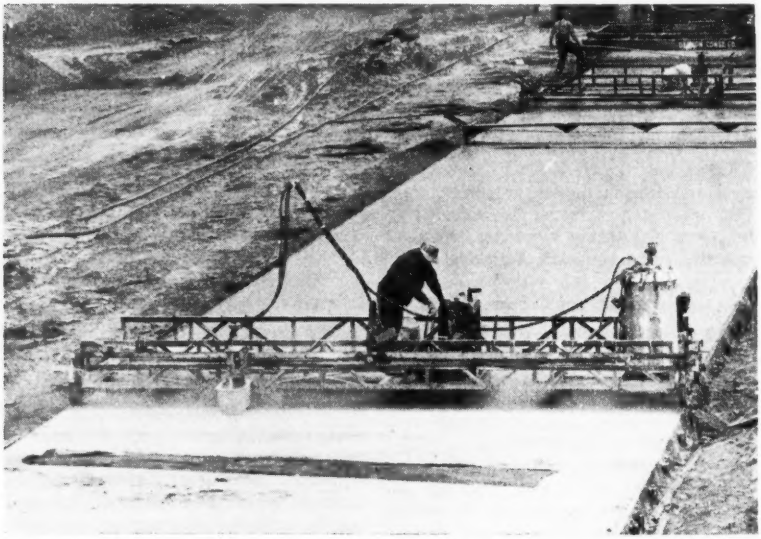
In the late 1920's, a new curing process was developed that involved depositing a waxy or resinous film on the fresh concrete. The materials used in this process came to be known as membrane curing compounds. Until World War II, little use was made of this development, but the need for simple methods of insuring ample curing of concrete in military airfields at that time led to extensive use of membrane curing. It is now widely used on military airfields, highways, irrigation canals, and is beginning to be adopted in building construction.

Membrane curing compounds may have a wax base, a resin base, a mixture of wax and resin, or an asphalt base. Paraffin, petrolatum, and microcrystalline waxes are used. Cumar and terpene resins are the most commonly used resins in the resin-base membranes. Membrane curing compounds are supplied both in clear form or in pigmented form. The pigmented form usually is preferred because of its ability to reflect sunlight and thereby keep the concrete cool and help retard evaporation of moisture further. Asphalt-based curing compounds have the disadvantage of absorbing heat and are used primarily where sun reflection is not of vital concern.

Polyethylene sheet has come into prominence recently for curing concrete. It has the advantage of extremely low permeability to water, but its higher price and the labor cost in applying it are deterrents to widespread acceptance.

Surface Sealers

Concrete floors often dust slightly so that they are difficult to keep clean and the dust is tracked into areas where white footprints are not regarded with favor. Surface sealing compounds have been developed to harden the surface and form a nondusting, impervious layer on the concrete floor. Sodium silicate solution was one of the earliest surface sealers. Solutions of fluoride salts or salts of fluosilicic acid, particularly the sodium and magnesium salts, are often used. Many proprietary surface sealers are combinations of sodium silicate and a fluoride or fluosilicate. Linseed oil or varnishes are used to obtain the same end



A modern self-propelled automatic sprayer for applying a membrane curing compound on freshly-laid concrete pavement.

(Courtesy of Truscon Laboratories, Inc.)

result without involving a chemical reaction with the concrete.

The chemically reactive surface sealers have also been used to obtain a more acid resistant concrete surface. When portland cement sets, hydrated lime, $Ca(OH)_2$, is formed as a reaction product; the $Ca(OH)_2$ is readily soluble in acids and is the primary cause of the low acid resistance of concrete. By treating a concrete object with various salts, such as fluorides for example, the $Ca(OH)_2$ can be converted to an acid-insoluble salt and the acid resistance of the concrete is increased. Treatment with a silicofluoride salt results in the formation of a bulky precipitate that fills or occludes the pores of the concrete, thereby retarding entry of acids or other aggressive chemicals into the concrete. A recent development known as "ocration" involves treatment of dry concrete objects with hydrogen fluoride, silicon tetrafluoride, or mixtures of the two in the gaseous state. It is claimed that greater penetration into the concrete and more positive protection against acid attack results from treatment in this manner. There are obvious handling difficulties in the practical application of this method, however.

Chemicals, Concrete, and the Future

The rapid growth in the use of concrete, combined with the greater use of chemicals with concrete, indicates new opportunities in the concrete market for the aggressive chemical producer.

The quantity of chemicals used for the surface treatment of concrete is difficult to estimate because of the variety of chemicals used and the difference in price. However, based on the best information available, there is probably a present eight million gallon market for surface applied chemicals of all kinds valued at some seven million dollars. Primarily due to the accelerated road

building program, this market is expected to at least double during the next five years.

Although the amount of a chemical added to a cubic yard of concrete may be a very small quantity, when this amount is multiplied by the total cubic yards of concrete produced in a year, an impressive figure is obtained. Although at present only a negligible amount of concrete is produced with chemical additions in amounts greater than one per cent of the cement (with the exception of $CaCl_2$ accelerator), the demand for these special concretes is growing and may ultimately represent an appreciable outlet for chemical products.

Additional developments undoubtedly will come out of the research laboratories to provide future opportunities for chemical additions to concrete. Chemicals that would enable the attainment of the ultimate strength of concrete in much shorter curing periods than are now possible would be a distinct advantage in practically every application of concrete. Studies now in progress on air-entrainment may lead to the development of more effective air-entraining agents that are less susceptible to variability caused by unavoidable variations in the cement, aggregates, and water used in making concrete. Chemical additions that would prevent the shrinkage of cement mortars and grouts, and that would improve their bonding power would be a boon to the masonry and tile industries. Improvement of the chemical resistance of concrete by chemical additions would lead to additional applications of concrete where more costly materials now are used and would result in a substantial reduction in the maintenance costs in many applications where concrete has a limited life because of chemical attack.

OUR APOLOGIES

It is very hard to apologize to an entire railroad for misspelling its name, and harder yet to do so when the error appears in the Table of Contents on the front cover of a magazine. Mistakes like that shouldn't happen. The Detroit and Mackinac Railway is not spelled with a *w*.

In addition to such an oversight as this, we failed to print our usual acknowledgements of assistance in preparation of an article. At this late date, the editors wish to thank the following individuals who were generous with their time and information during the preparation of "Northeast Michigan and the Detroit and Mackinac Railway" *(Business Topics,* July 1957.) For the D&M: Charles Pinkerton of Tawas City, President; Frank Catto of Alpena, Industrial Agent; Harry Young of Cheboygan, Agent; Jack Parker, the Parker Advertising Agency, Saginaw. For various industries and enterprises in the area: E. Bobolts, Vice President, The Besser Company; Thomas Fletcher, President, Fletcher Paper Company; Benjamin Raymond, The Wyandotte Chemical Corporation, all of Alpena; Harold and Harry Whiteley, Editors of *The Presque Ile Advance;* Lewis Patterson, District Manager, Michigan Limestone Division, United States Steel, all of Rogers City; Roland LeHaie, Manager, the Charman Paper Company; M. M. Riggs, Editor, *The Cheboygan Daily Tribune,* of Cheboygan.

INTEREST:

A Moral Problem or a Business Matter?

Time was when the morals of taking interest were a matter of hot debate. This is one of the oldest of problems, it seems: 5,000 years ago Hammurabi was writing laws about the legal rate of interest. The Greeks and Romans later made it a subject for philosophical discussion. So did the Hebrew lawgivers and prophets. Christian theologians of the Middle Ages considered interest-taking impious, on the grounds that it is unnatural for money to breed money, since it is a dead metal: therefore to make it do something that is unnatural for it is immoral. Christians were long forbidden to lend money at interest. Among the changes wrought by the Protestant Reformation was one in the attitude toward money. It became respectable to put money out at loan or to invest it, under conditions similar to those of today.

Any rate of interest the writer considers excessive is called *usurious*. Here are some opinions on usury:

Usury is murder. Hebrew Proverb

Manifest usurers shall not receive Christian burial.
Third Lateran Council of the Church, 1179

Interest springs from the power of increase which reproductive forces of nature give to capital. It is not an arbitrary but a natural thing; it is not the result of a particular social organization, but the laws of the universe which underlie society. It is, therefore, just.
Henry George, *Progress and Poverty*

In investing money the amount of interest you want should depend on whether you want to eat well or sleep well.
J. Kenfield Morley

YOU CAN'T DEDUCT THAT

*BY CECIL R. UPHAM**

If there is such a thing as a rosy lining to the cloud of a family medical bill, it is that under certain circumstances some of it is deductible for income tax purposes. The provisions of the law in this connection are highly technical. Deductible and non-deductible medical expenses will become clearer defined for the bill-and-tax-payer through reading this analysis of the nature of tax-exempt medical expenses.

Section 213 of the 1954 Internal Revenue Code provides that "there shall be allowed as a deduction the expenses paid during the taxable year, not compensated for by insurance or otherwise, for medical care of the taxpayer, his spouse, or a dependent (1) if neither the taxpayer nor his spouse has attained the age of 65 before the close of the taxable year, to the extent that such expenses exceed 3 percent of the adjusted gross income; or (2) if either the taxpayer or his spouse has attained the age of 65 before the close of the taxable year (a) the amount of such expenses for the care of the taxpayer and his spouse, and (b) the amount by which such expenses for the care of such dependents exceed 3 percent of the adjusted gross income."

The Code also sets up a limit with respect to medicines and drugs. This deduction "shall be taken into account only to the extent that the aggregate of such amounts exceeds 1 percent of the adjusted gross income." There is a further limitation provided that "the deduction shall not exceed $2,500, multiplied by the number of exemptions allowed for the taxpayer and the maximum deduction under this section shall be (1) $5,000, if the taxpayer is single and not head of household, not a surviving spouse or is married but files a separate return and (2) $10,000, if the taxpayer files a joint return with his spouse or is the head of a household or a surviving spouse." The additional exemption for old age or blindness is not applicable in determining the number of taxpayer exemptions.

The Code defines the term "medical care" to include amounts paid (a) "for the diagnosis, cure, mitigation, treatment, or prevention of disease, or for the purpose of affecting any structure or function of the body (including amount paid for accident and health insurance), or (b) for transportation primarily for and essential to medical care".

Under part (a) of this definition the taxpayer may deduct (1) the cost of professional services paid to a chiropodist, licensed chiropractor, dermatologist, gynecologist, licensed osteopath, physician, physiotherapist, psychiatrist, registered nurse and surgeon; (2) the cost of laboratory examinations and tests paid for blood tests, cardiographs, metabolism test, urine analyses and X-ray examinations; (3) the cost of dental services paid for cleaning teeth, X-rays, extracting teeth, gum treatment, oral surgery and straightening teeth; (4) the cost of hospital services paid for anesthetist, hospital bills, vaccines, use of operating room and X-ray technician; (5) the cost of medicines including drugs, sick-room supplies, vitamins and tonics; (6) premiums paid to mutual or other insurance companies or plans for that part of any accident policy which provides reimbursement for medical expenses, hospitalization insurance such as Blue Cross and Blue Shield, medical service cooperations and medical care costs paid to a college as part of tuition bill if the amount of such medical care is separately stated

*Mr. Upham is Associate Professor of Accounting, Michigan State University.

on the bill; (7) the cost of equipment and supplies consisting of such items as abdominal supports, ambulance hire, arches, artificial teeth or eyes, back supports, braces, crutches, eye glasses, hearing aids, invalid chair, splints and trusses; (8) the cost of medical treatments including such items as blood transfusions, diathermy, electric shock treatments, healing services, injections, insulin treatments, nursing, radium therapy, ultra-violet ray treatments and X-ray treatments.

Deductions permitted the taxpayer under part (b) of this definition are payments for travel costs essential to get to and from a doctor's office, to prevent or alleviate a physical defect, mental defect or illness: travel expense (above normal transportation) of a disabled person to get to his job where the work is prescribed by a doctor as occupational therapy and travel expenses incurred by a parent where it is necessary for the parent to accompany a child because of its physical condition or immaturity.

Several illustrations are cited below involving the monetary application of the provisions of the Code.

Example I. Mr. and Mrs. Harry Smith, having one dependent child, had adjusted gross income for 1957 of $3,600. During 1957 he paid $350 for medical care, of which $100 was for treatment of his dependent child and $250 for an operation on Mrs. Smith performed in May 1957. During the year he received $75 under a health and accident policy to cover a portion of the cost of Mrs. Smith's operation. The deduction available to the taxpayer providing he itemizes his deductions and does not compute his tax by use of the tax table, is $167, computed as follows:

Payments in 1957 for medical care	$350
Less: Insurance reimbursement	75
Net cost	$275
Less: 3 percent of $3,600 (adjusted gross income)	108
Excess, allowable as a deduction in 1957	$167

If either the taxpayer or his spouse has reached the age of 65 before the end of the taxable year, the 3 percent limitation on the deduction for medical expenses does not apply to expenses for medical care of the taxpayer or his spouse. In such a case the taxpayer may deduct, subject to the 1 percent limitation applicable to drugs and medicines, (a) the amount of all payments for the medical care of taxpayer and his spouse, and (b) the amount of payments for medical care of his dependents to the extent that they exceed 3 percent of his adjusted gross income.

Example II. John Oxbow, who became 65 years of age December 22, 1957, makes his return on the calendar year basis. His adjusted gross income for 1957 was $8,500. Medical bills were: (a) $850 for himself and spouse and (b) $175 for his dependent son. No part of these expenses were compensated for by insurance. The allowable deduction for 1957 is $850, the full amount of the medical expenses for Mr. Oxbow and his wife. No deduction is allowable for the amount of $175 paid for medical care for his dependent son since this amount does not exceed 3 percent of his adjusted gross income.

Example III. Mr. and Mrs. S. J. Moore who have one dependent child make a joint return for the calendar year 1957. He became 65 years of age on August 10, 1957. The adjusted gross income of Mr. and Mrs. Moore in 1957 is $45,000. Medical care expenses were: (a) $3,500 for Mr. Moore; (b) $1,800 for Mrs. Moore and (c) $3,200 for the dependent daughter. No part of these payments was for medicine and drugs and no part was compensated for by insurance or otherwise. The allowable deduction in 1957 would be $7,300 computed as follows:

Payments for medical care of Mr. and Mrs. Moore in 1957	$5,300
Payments for medical care of dependent daughter in 1957	$3,200

Less: 3 percent of $40,000 (adjusted gross income).....	1,200	2,000
Allowable deduction in 1957		$7,300

Expenses for medicines and drugs are to be taken into account in computing the deduction for medical expenses paid during the taxable year only to the extent that the aggregation of such amounts exceeds 1 percent of taxpayer's adjusted gross income for the year. The excess over 1 percent is added to other medical expenses for the purpose of computing the medical expense deduction.

Example IV. Simon Bolivar, single, no dependents, had an adjusted gross income in 1957 of $8,000. He reports on the calendar year basis. During 1957, he paid his doctor $375 for medical services, a hospital $125 for hospital care and he also spent $150 for medicines and drugs. No part of these payments was compensated for by insurances or otherwise. The allowable deduction for 1957 is $330 computed as follows:

Payments for medical care in 1957:		
Doctor		$375
Hospital		125
Medicines and drugs...$150		
Less: 1% of $8,000 (adjusted gross income).	80	70
Total medical expenses to be taken into account.....$570		
Less: 3% of $8,000 (adjusted gross income)		240
Allowable deduction in 1957..$330		

The following special situations arising out of the application of the Code with respect to the deductibility of medical and dental expenses are cited below along with the ruling of the Bureau of Internal Revenue:

Air conditioning device. The cost of an air conditioning device, which has been installed in a room of the taxpayer's residence for the purpose of affecting relief from an allergy or for relieving difficulty in treating due to a heart condition, plus the operating expenses, less any resale or salvage value, constitute a medical expense, provided that the need for it is substantiated by evidence that the device is used primarily for the alleviation of a person's illness and provided further that the device does not become a permanent part of the dwelling and may be removed to other quarters.

Rev. Rul. 55-261, 1955-1 CB307.

Food and beverages for specific ailments. Where the special food or beverage is taken as a substitute for food or beverage normally consumed by a person and satisfies his nutritional requirements, the expense incurred is a personal expense; but where it is prescribed by a physician for medical purposes and is in addition to the normal diet of the patient, the cost may qualify as a medical expense.

Rev. Rul. 55-261, 1955-1 CB307.

Health institute. Ordinarily, fees paid a health institute where the taxpayer takes exercies, rubdowns, etc., are held to be a personal expense. However, fees paid to a health institute may be deductible as a medical expense only when such treatments by such institutes are prescribed by a physician and are substantiated by a statement by the physician that the treatments are necessary for the alleviation of a physical or mental defect or illness of the individual receiving the treatments.

Rev. Rul. 55-261, 1955-1 CB307.

Iron Lung. In order to provide necessary care at home for a dependent stricken with polio, taxpayer built a special hospital room at his home to accommodate an iron lung, rocking bed, extra chest respirator and other equipment. During the dependent's confinement in the hospital room added expenses were necessary, such as power for operation of the iron lung, special telephone setup, nursing service, etc. It was also necessary to make a complete change of the home heating unit.

The cost of construction of the special room even though primarily for medical

purposes, and the cost of altering the home heating unit were held to be permanent improvements which increase the value of the property and do not qualify as medical expenses. The cost of operating the iron lung and associated equipment and the expense of nursing care during confinement in the special room are expenses incurred primarily for the alleviation of a physical illness and may be deducted as a medical expense.

Rev. Rul. 55-261, 1955-1 CB307.

Maternity clothing, antiseptic diaper service, etc. Amounts expended for the preservation of general health or for the alleviation of physical or mental discomfort which is unrelated to some particular disease or defect are not expenses for medical care. Expenditures for maternity clothing, antiseptic diaper service, wigs and tooth paste, are held to be personal expenses.

Rev. Rul. 55-261, 1955-1 CB307.

Mattress and plywood boards. Taxpayer's spouse has arthritis of the spine for which a special mattress and a certain thickness of plywood boards has been prescribed. Under such circumstances the expense of a special mattress and plywood boards prescribed for the relief of a physical disease or illness constitutes a medical deduction.

Rev. Rul. 55-261, 1955-1 CB307.

Oxygen Equipment. Expenditures paid for oxygen equipment and oxygen used to alleviate difficulty in breathing due to a heart condition may be deducted as a medical expense.

Rev. Rul. 55-261, 1955-1 CB307.

Practical Nurse. Salary paid to a practical nurse, hired to care for a normally healthy infant whose mother had died in childbirth, was not a medical expense.

Wendall, 12 TC 161, Dec. 16,799.

An 83-year-old-man, after major surgery, hired an attendant on the advice of his physician. She was not a registered nurse or a licensed practical nurse and had no special qualifications for nursing, but she was able to render the kind of care petitioner required during his illness. She was paid $2,340. The commissioner allowed one-third, or $780, as a reasonable allowance for medical expenses. The Tax Court allowed $1,535.

Jacob Hentz, Jr., Est., 12 TEM 368, Dec. 19564 (m).

Psychiatric Therapy. Due to severe emotional disturbances, a taxpayer's daughter is sent to a treatment school operating 12 months in the year, at which school she is under the care of a practicing psychiatrist and receives regular psychiatric therapy. Under such circumstances the amount paid for psychiatric care which is for the primary purpose of alleviating a mental illness is deductible as a medical expense. However, the cost of instruction at such school which does not represent medical care is not deductible.

Rev. Rul. 55-261, 1955-1 CB 307.

Psychologists. Amounts paid to qualified psychologists come within the meaning of "medical care", and constitute deductible medical expenses.

Rev. Rul. 143, 1953-2 CB 448.

Remedial Reading. Taxpayer's son is attending a college for personal counseling program for remedial reading. He is handled by a psychologist and is receiving instruction together with psychotherapy. If the psychotherapy is incidental to general supervision counseling, the entire expense constitutes a personal expense. However, if the cost of the psychotherapy has been incurred primarily for the prevention or alleviation of a physical or mental defect or illness, the cost thereof may be deducted as a medical expense.

Rev. Rul. 55-261, 1955-1 CB 307.

Training of a Deaf Child. Cost of special instruction or training, such as in speech and lip reading, designed to alleviate the loss of speech which is attributable to deafness and to compensate in part for the loss of hearing is deductible as a medical expense. However, the cost of ordinary instruction which a child would require in any event is not a medical expense and is not deductible.

Rev. Rul. 55-261, 1955-1 CB 307.

Traveling Expenses. The travel expense and cost of maintaining taxpayer's 5-year-

old daughter in Arizona were deductible as medical expenses, where the child suffered from respiratory ailments and it was impractical for taxpayer to move his family from Ohio to Arizona. However, the portion of the boarding school tuition which did not represent medical facilities, meals and lodging was not deductible.

Com. v. Stringham, (CA-6) 50-2 183 Fed. (2n2) 579.

Taxpayer's minor son was having difficulty in school and with the police. Their family physician recommended a change in environment and suggested a boys' school in New York. Taxpayer improperly listed tuition, travel and medical expenses for the son as medical expenses.

G. Pascal, 15 TCM 434, Dec. 21,671 (m).

Taxpayer went to Florida for one month to mitigate and improve his condition after a stroke. The court allowed $750 from a claim of $1,481.31 for hotel rooms, meals and incidental expenses as a deductible medical expense. Taxpayer's train fare was included, but transportation for his wife was not included. Expenses of his daughter and cost of extra meals, telephone, car, cash advances, and c.o.d. charges were not deductible.

Embry Est. v. Gray, (DC Ky) 56-2.

The expense of travel, board and lodgings at two resort hotels in New Jersey and at a ranch in Arizona, incurred by taxpayer after his wife suffered a coronary occlusion, was not deductible as a medical expense. Though the trips benefited taxpayer's wife, such benefit was incidental.

Havey, 12 TC 409, Dec. 16, 1872.

Similarly, taxpayer's expenditures in taking his wife to Florida and maintaining her there for a month and a half following her illness from pneumonia were not deductible.

Martin W. Keller, 8 TCM 685, Dec. 17,129 (m).

A throat operation and subsequent nervousness made it difficult for taxpayer's wife to care for her two young daughters. Upon the advice of his wife's physician, the taxpayer sent the children to day school and boarding school. He was not entitled to deduct, as medical expenses, expenses incurred in sending the children to school since the children themselves were in excellent health.

Samuel Ochs v. Com., (CA-2) 52-1 195 Fed. (2d) 692.

After a resection operation was successfully performed on the leg of taxpayer's 16-year-old-daughter, his wife and daughter left on a trip to the Shrine in Lourdes. While there the daughter attended mass, took the baths, and participated in the candlelight procession of pilgrims. The expenses of the trip were not deductible as medical expenses since the trip was not taken on the suggestion of or pursuant to the order of any physician but, according to taxpayer, in the hope of obtaining spiritual aid to supplement the medical care given by the physician.

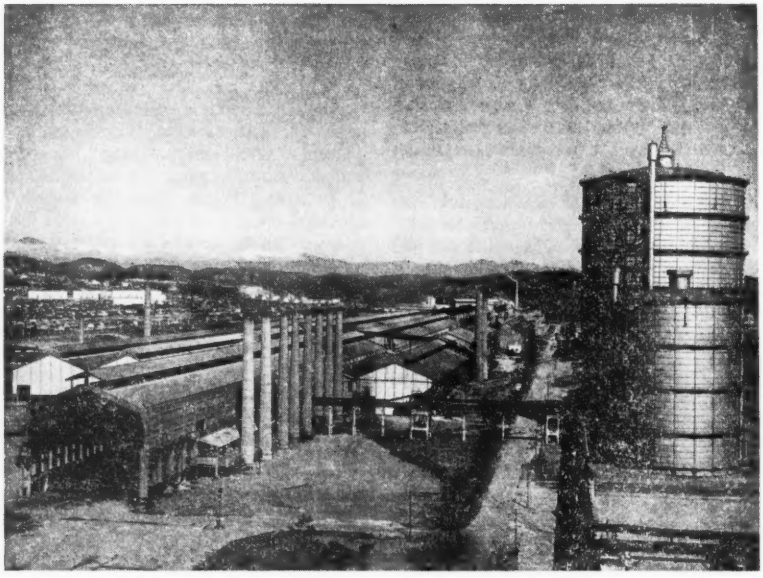
Vincent P. Ring, 23 TC 950, Dec. 20,892.

Lodging expenses, while traveling, were disallowed as medical expenses, since the advice of taxpayer's doctor was to find a new home more suitable to his mental condition, not to just travel.

Gunnar E. Erickson, 13 TCM 1045, Dec. 20, 662 (m).

Traveling expenses were disallowed where taxpayer's husband, suffering from arteriosclerosis, spent the winter in the south, the summer in the North and the Spring and Fall in St. Louis, although it was done on his physician's advice.

Bertha M. Rodgers, 25 TC 254, Dec. 21,336.



Brazil's largest steel plant at Volta Redonda, Argentina. A million tons a year by 1958.

STEEL DEVELOPMENT AND INDUSTRIALIZATION IN LATIN AMERICA

*By PEDRO C. M. TEICHERT**

Acceleration of one of the century's greatest development booms will depend largely upon local steel production. Here a South American economist surveys the future of the steel industry south of the border.

Latin America's Rapid Growth

While at present our attention is mostly drawn to Europe, Asia, and the Middle East, Latin America is silently undergoing one of the world's biggest development booms. What is happening in Latin America is a story of tremendous growth and rapid change. Populations are expanding and economies booming, while vast resources are tapped. Industrialization is rapidly gaining momentum. In the years just ahead, Latin America is expected to develop economically much faster than Asia or Africa. Some Latin American nations are actually developing at a faster rate than the United States.[1] By the turn of the century Latin America is expected to have twice as many people as the U.S.A. and Canada combined.[2]

In the past four years, industrial production has increased about twenty per cent. Development of mineral resources is fairly well advanced, but vast deposits remain to be tapped. All this development has taken place without the benefit of large handouts from Washington. While since World War II the U. S. government gave about 41.5 billion dollars to other parts of the world, Latin America has only received a little over half a billion. Nevertheless, in order to assure their continued development, the Latin American republics would like to be able to borrow larger sums from the U. S. government. Also private foreign capital is invited to participate in Latin America's current development boom.

At present U. S. private capital investments are responsible for about ten per cent of all production in Latin America and amount to over 6.5 billion dollars. They are increasing at the rate of 400 million a year.[3] U. S. - Latin American trade has also increased tremendously in the past twenty years—about five hundred per cent—and now stands at seven billion dollars a year. It is approximately equal to U. S. trade with Europe and nearly twice as large as U. S. trade with Asia.

Over the past thirty years Latin America has increased its output of goods and services by 2½ times. Living standards have increased 2.2 per cent yearly, or a cumulative total of 54 per cent in twenty years. Though Latin America still is predominantly an agricultural area in the sense that some 58 per cent of the active population work on the land, it is quickly turning towards urbanization and industrialization.[4] Goods processing and textiles are still the largest manufacturing industries in Latin America, but heavy industries are now growing fastest, especially where steel mills are located.

Fluctuating Development. On a country by country analysis, the per capita rate of growth in Latin America shows its

*Dr. Teichert is Professor of Economics at the University of Mississippi.

1. United Nations, *Statistical Yearbook 1956*, p. 472.
2. "The U. S. Rediscovers America", *U. S. News and World Report*. July 27, 1956.
3. U. S. Department of Commerce. "The Role of U. S. Investments in the Latin American Economy", *Survey of Current Business*, January 1957.
4. Pedro Teichert, "Latin American Economic Development and U. S. Business Opportunities," *Business Topics*. (East Lansing; Bureau of Business Research, Michigan State University), Vol. 4, No. 3, November 1956, p. 18.

widest fluctuation. Colombia, Venezuela, and Peru have had recent annual per capita rates of growth of five per cent, four per cent, and over three per cent respectively (1951 to 1954). In 1955 Mexico's gross national output in real terms rose ten per cent, lifting per capita output seven per cent. Agricultural production expanded ten per cent while manufacturing output showed an 11 per cent gain. Substantial increases occurred in almost all branches of production, and while private domestic investment in industry soared by 40 per cent last year, the inflow of private investment from other countries is still on the rise.

The only major Latin American country that did not keep up with its expansion potential is Argentina. While according to its annual growth rate of 3¼ per cent from 1938 to 1948, it should now have a gross national income of about one hundred billion pesos (1950 prices), it has only reached the 70 billion peso mark. Since 1948 the Argentine economy has remained static. Large investments are needed in oil, farming, transports, and electric power. Some sources suggest that Argentina will need one billion dollars of foreign investments to get the economy in top shape again.

The following figures best illustrate the general pattern of growth for the 20 Latin American republics during the 1945-55 period. (See Table I below.)

Manufacturing has obviously had the largest increase followed by mining and other activities. Agricultural expansion is slowest. This definitely indicates Latin America's trend towards accelerated industrialization. Most Latin American nations have more than doubled their industrial output since 1939. Therefore, it will be the purpose of the remainder of this study to analyze the iron and steel industry which is basic to Latin America's successful process of industrialization and rapid development.

The Development of Iron and Steel Industries

One of the most significant indicators of economic progress and the process of industrialization is output and consumption of iron and steel. Latin America's per capita use has doubled since the mid-1930's and consumption has recently been rising ten per cent a year. Total use of steel in Latin America now runs at a yearly rate of 6.6 million tons and has tripled since prewar. But as with energy consumption, per capita use is yet very low when compared with the U. S. and Western Europe. Use of steel has gone up much faster than population, and per capita consumption has doubled in the past two decades. Per capita consumption in 1955 was 83 pounds per person, while in Western Europe it is six times larger and 13 times larger in the United States. In order to maintain Latin America's rapid rate of growth, consumption would have to rise to 12-17 million tons a year in the next ten years.[5]

In 1956, imports still supplied 62% of

5. The Chase Manhattan Bank, *Latin American Business Highlights*, December 1956, p. 2.

TABLE I

LATIN AMERICA'S STRUCTURE OF PRODUCTION*

(Billion Dollars at 1950 prices)

	1945	*1955*	*% Increase 1945-1955*
Agriculture	$ 7.5	$11.3	51%
Manufacturing & Building	7.0	12.4	77
Mining	1.3	2.1	62
All Other	14.0	22.4	60
Total	29.8	48.2	62

*Source: The Chase Manhattan Bank. *Latin American Business Highlights.* September 1956, p. 4.

the area's steel consumption and Latin America bought 1/5 of all world steel exports. Nevertheless local production has increased faster than imports and it is now 5½ times larger than in prewar days. Output is expected to reach 6.4 million tons by 1960. There exists no doubt that greater steel supplies plus the spread of steel technology have spurred the development of metalworking industries and have furthered the process of economic development and industrialization in general. Steel is an increasingly important factor in economic development, especially since 1945 when most of the important Latin American nations were trying to develop steel mills at almost any cost. Since that date production of all goods and services has increased at an annual rate of 5.1%, manufacturing at 6.1% and steel consumption has gone up an average of ten per cent a year.

Again it is the wealthiest Latin American republics that have the largest steel consumption, starting with Argentina, Brazil, Mexico, Venezuela, Chile, Colombia, Cuba, Peru, and Uruguay. Steel consumption has gone up as a result of the development of metalworking industries in most of these republics, since they are now producing or assembling motor vehicles, freight cars, refrigerators, electric motors, machine tools, steel furniture, and other products made of steel. Many Latin American republics are entering a phase where industrial growth will emphasize capital goods and consumer durables. While manufacturing output and gross production have doubled since 1945-1955, steel production has increased by 350% and consumption by 200%.

As against the present yearly use of steel of about 1.1 billion dollars, between 2 and 2.9 billion will be consumed in the next ten years. To meet these needs either imports or local production will have to be increased. In the late 1930's Latin America imported about 9/10 of consumption, in 1956 only 62%. This still accounted for nine per cent of the area's total imports and amounted to a foreign exchange drain of about 700 million. Nevertheless, recent increase in domestic production has been impressive. Since 1939, eight integrated steel mills have gone up in Latin America and steel making capacity has soared from 600,000 tons yearly to 3,360,000 tons in 1956. Programs under way or announced will increase capacity to 4.3 million tons by 1958 and to 6.4 million tons by 1960, which is almost double the present level and will cover more than 3/5 of local demand. Production is expected to rise faster than demand, and as a result imports of steel and steel products may decline in 1960 from four million tons to perhaps 3½ million.

Table II gives a clear picture of present steel capacity and of future projects.

Some Theoretical Aspects and Problems of Latin American Steel Developments

It is generally argued that local steel production and expansion are supposed to have the following effects: 1) To save foreign exchange, 2) to make steel more readily available and thus to encourage the growth of steel using industries and establishments, and 3) to help advance the level of technology by promoting development of metalworking industries.

In spite of the fact that steel is a relatively costly product to ship in international trade—it costs almost twenty-five dollars to ship a ton of carbon steel from New York to Rio de Janeiro and twenty dollars from Antwerp to Rio—the creation of an integrated steel industry poses a number of problems for a rapidly developing nation.

1) As with the development of energy supplies, heavy capital investment is necessary since the investment per dollar of output is also high. The ratio for general manufacturing is less than 1/3 of the investment per dollar of output required in the steel industry. 2) For efficient production a large steel mill is required, since costs per ton of finished steel in a 100,000 ton mill would be double that

TABLE II

INTEGRATED IRON AND STEEL PLANTS IN LATIN AMERICA*

Country and Site of Plant	First Year of Production	Annual Production Capacity 1954 (000 ingot tons)	Annual Production Capacity 1958 (000 ingot tons)
Argentina			
San Nicolas, Buenos Aires	Under construction	—	588
Brazil			
Volta Redonda, Rio de Janeiro	1946	710	1,000
Monlevade y Sabara, M.G.	1921	190	250
Acesita, Minas Gerais	1944	73	125
Sao Paulo	1942	200	400
Belo Horizonte, M.G.	1955	—	100
Piassaguera, Sao Paulo	Planned	—	300
Sao Paulo	1934	30	n.a.
Chile			
Huachipato, Concepcion	1950	325	350
Colombia			
Paz de Rio, Boyaca	1954	122	374
Mexico			
Monterrey, Nuevo Leon	1903	255	400
Monclova, Coahuila	1944	375	n.a.
Piedras Negras, Coahuila	1955	—	63
Peru			
Chimbote, Ancash	Under construction	—	60
Venezuela			
Puerto Ordaz, Bolivar	Under construction	—	300
Total		2,280	4,310

*Source: The Chase Manhattan Bank. *Latin American Business Highlights.* December 1956, p. 7.

of a one million ton mill. The same problem is here present that is found in connection with large hydroelectric power plants, which produce cheaper the larger the output. 3) Unlike electric energy, however, in steel manufacturing there are literally thousands of products — from sheet, strip, and plate to wire, rails, rods, and sections — which are only broad groups, each one having many subdivisions. Only if a large market exists for each item will the output of these steel products be economical. 4) Finally, where fuel, other raw materials and equipment must be imported, the saving in foreign exchange involved in the local manufacture of steel will drop to fifty per cent or sixty per cent.

According to the fourth point Argentina, which is the largest Latin American steel consumer, should be least qualified to produce its steel supply locally, since both fuel and raw materials are lacking. Nevertheless, Argentina has local finishing mills with a rated capacity of more than a million tons a year. In order to

keep them running at full capacity Argentina has to import about 4/5 of the ingots needed, since its own ingot production only amounts to about 240 thousand tons, mostly from scrap. To meet the growing need for steel and in order to conserve foreign exchange, the government, together with private interests, is now building an integrated steel mill at San Nicolas with an annual capacity of 588,000 ingot tons (See Table II). Coal and oil will have to be imported.

The largest Latin American steel producer is Brazil and output is up to 1¼ million tons a year, more than ten times prewar. By 1960 output is expected to reach 2¼ million tons. The largest Latin American steel mill at Volta Redonda was producing 710 thousand tons in 1954 and will be producing one million tons by 1958.[6] Brazil is very fortunate in having vast iron ore resources, but it has to import coking coal. Chile's steel output is sufficient to cover local demand leaving a twenty per cent export surplus. Chilean steel imports, as in most other steel producing Latin American republics, are generally limited to specialized types of steel.

Colombia only covers half its demand by its local steel production. The same is true for Mexico, though it is the second largest steel producer in Latin America. From the 1955 level of output of 510,000 tons, Mexico plans to boost output to 1.9 million tons by 1960, which might make Mexico independent of imports. Another country that has a steel mill is Peru. Output will begin in late 1957 and cover half the demand. Peru at present is a net exporter of both iron ore and coal. In 1956, construction of a 173 million dollar plant, near Puerto Ordaz began in Venezuela. Output in 1958 is supposed to reach 300,000 tons annually and 121,000 tons will be added in 1959. This would cover about 2/3 of Venezuela's total steel consumption, which is the largest on a per capita basis in Latin America. Almost the entire demand is now consumed by the oil industry.

6. *Brazil*, Pan American Union, 1953, pp. 30-31.

In the future many more republics may follow the example of the countries that now have steel mills since Latin America is rich in iron ore resources. As of now, Latin America has twenty per cent of the world's known iron ore reserves. But little detailed search has really been made, and of the twenty billion tons of currently known reserves, only nine million tons were mined in 1954. Iron content of Latin America's ores is also very high, ranging from 52% to 60%, and more than that in Venezuela. Unfortunately for Latin America known deposits of coking coal are small and of relatively poor quality. Less than five per cent of Latin America's coal deposits can be used for coking coals.[7]

Conclusion

Latin America's increased availability of local steel has helped develop the metalworking industries and has promoted economic development and industrialization in general. For instance, Brazil now supplies half the weight of all motor vehicle manufacturers from local sources. In Chile, in 1955, the first large factory for farm machinery was set up and the production of electrical household appliances meets more than half consumer demand. In Mexico steel output has shifted to meet the changing needs of the mechanical industries and the overall economic advances of the country. When completed new facilities for tin plate and sheet will meet the entire domestic demand for these products. At present Mexico is even producing 100,000 tons a year of oil-producing equipment.

In toto Latin Americans have so far invested a total of 1½ billion dollars in their steel industries, and projects under way call for another 1½ billion by 1960-61. That, of course, represents a considerable drain on the investment resources of the Latin American republics which are setting up steel mills. Furthermore several nations have incurred sizable external debts to finance the construction of their mills.

7. The Chase Manhattan Bank, *Latin American Business Highlights*. December 1956, p. 5.

It is not quite clear whether such sizable investments were justified solely from an economic point of view, since local production does not seem to have reduced the cost of steel to domestic consumers. Most producers are still protected behind high tariff walls, since steel production has not attained a volume yet that permits taking full advantage of the economies of large scale production. Therefore, prices have remained high and the steel producing republics had to sustain a heavy drain on scarce capital resources. Yet steel mills continue to be placed highest on the priority list of desirable Latin American investment projects.

The reasons for this preference are more of a social nature and are concerned with the total impact the erection of steel mills will have on the transformation of Latin America's agrarian economies. A steel industry is a symbol of advanced industrial development which some republics want to obtain at any cost. Also in practice many nations are not in a position to raise sufficient foreign exchange to supply the country with all the steel imports needed. In such a situation local production, even if more expensive, would increase the tonnage of steel available to domestic users.

But it is rather from the viewpoint of over-all economic growth that the availability of a steel industry and its output may be of utmost importance to Latin America, since it spurs industrial development in a number of ways. In the first place technical knowledge is spread over a wide area of the economy after steel using businesses are established. Secondly, local metalworking production is encouraged. Thirdly, local steel production might save enough foreign exchange to pay for the importation of the steel producing equipment and other machinery and equipment needed to support industrial growth in general. In summary, local steel production will accelerate the process of economic growth and industrial development and though prices of locally produced goods might be higher than corresponding imports, the benefits derived from the general economic, technical, and educational progress might far outweigh the disadvantages of industrialization.

Also in the long run general economic development will reach the point where economies of large scale production can be obtained in steel manufacturing. Nevertheless imports of special steels will continue to grow together with local manufacture of the more common types, since it will be many years before the size of the market will support economical production of a full range of steel products. For a long time to come local industries will need products that cannot be made locally.

Undoubtedly local steel production has accelerated economic development in Latin America by setting up integrated steel mills which have further encouraged the growth of metalworking industries and laid the groundwork for continued and broadened economic development. Finally it might well be concluded that the more efficient Latin America's local steel industries become in the future—both in production and marketing—the greater will be their contribution to overall economic development and the present process of industrialization and development.

VOX POPULI

A Study of Medical Insurance Opinion in Michigan

Since most people in Michigan have some type of prepaid medical insurance, any changes made in the policies will probably affect most of us. It is only reasonable, then, that the medical profession should go directly to the people to find out what kind of medical protection we want. The facts are now in. They are to be presented to the House of Delegates of the Michigan State Medical Society in Grand Rapids, September 23, and will then be incorporated in recommendations to all companies that offer medical and surgical insurance programs.

To get this information a state-wide survey, one of the biggest public opinion samplings of its type ever undertaken in the United States, was carried out jointly by the Michigan Health Council and the Michigan State Medical Society. More than 640,000 people were reached either by questionnaires or personal interviews. One of the purposes of the 130-member House of Delegates of the Medical Society is to formulate policy on socio-economic matters affecting the medical profession and the people of Michigan. Changes in medical and surgical coverage and health insurance certainly fall within the House's scope. The state-wide study they recommended sought four types of information:

1. What services do people want covered by medical prepayment plans? What should be the order of priority of these services, if all cannot be furnished for a certain sum?
2. How much will people be willing to budget for these services?
3. What do doctors want from medical insurance plans?
4. What do people really need most in the way of medical coverage?

Need for the Survey

In a succint editorial of July 14, 1957, the Detroit Times commented realistically: "It's clear enough that strong public sentiment favors putting more medical care on a payment-every-month basis. But how far should this go? . . . The problem here is to find out what people really want, in view of the inescapable fact that whatever we get has to be paid for."

The Michigan Health Council and the Michigan State Medical Society joined forces to find the answer to a definite need. Top-notch sociologists and research people were called in as consultants to make the study as accurate a cross-section as possible. Among these experts was Dr. David J. Luck, then head of the Bureau of Business Research, MSU. In less than three months from the beginning of the project, questionnaires and interviews were being employed to get hold of public opinion right at its source.

The mail survey was carried out by the Michigan Health Council, a nonprofit educational organization with a membership of many associations concerned with health. Questionnaires were sent to 66,500 state residents. Lansing was designated a control city, as representing all ethnic, economic and occupational groups.

Many Opinions

The questionnaire covered present insurance plans, benefits that might be added or eliminated, and how much people would be willing to pay for additional coverage. Age, income, size of community, occupation and membership in unions, farm groups and professional societies were also covered. Though 66,500 such questionnaires might normally be considered enough to reveal trends in thinking, further coverage was obtained by publishing the document in full in the Detroit Times and the Lansing State Journal, so readers might also reply. In all, a whopping 640,000 question-

naires were made available to the people of Michigan by these two means. In addition, 1,000 more detailed personal interviews were conducted throughout the state by the Market Opinion Research Company of Detroit.

The medical profession and the public are partners in any system of medical care. If there is to be a change in the system, both parties should have an opportunity to state their views about any proposals. Hence a technical questionnaire was mailed to Michigan M.D.'s by their State Medical Society, covering the administration of present major plans and insurance policies, subscriber contract arrangements and methods of payment.

All these interviews and questionnaires together provided data for the first three parts of the four-part study: what people want in medical plans; what they are willing to budget for these services; what doctors want in these plans, both as consumers and practitioners.

The fourth part—what people really need most in medical services—was covered by a special committee of the State Medical Society. They amassed all pertinent data from previous national and state surveys. This information will be compiled and made part of the report along with the present survey data.

Speed— and Why

The entire study is unique in many ways. For one thing it was carried out on an almost supersonic time schedule: from the decision to the report of results, it was finished in only five months. Such speed was essential to unbiased accuracy. No special interests or pressure groups could marshal their forces to stack the results with planned answers.

An unusual feature was the extensive publicity campaign by radio, television and newspapers concomitant with the survey. There was also a special effort made to get the questions into the hands of the people. Personal letters enclosing a copy of the questionnaire were sent to management men in industries, municipal government and merchandising and trade associations, requesting publicity in house organs, and offering additional questionnaires for distribution. The response was gratifying.

Why this unusual publicity so early in a survey? It was part of the effort to get a maximum return. To date, this return has been running well above the usual percentage of replies to questionnaires.

Reporting the Answers

Tabulation began immediately after the deadline for returns, July 31. Write-in answers were coded for incorporation with the precoded answers, then all were tabulated on IBM machines by the Service Bureau Corporation. The resulting information went into a full-scale report to be presented to the House of Delegates in Grand Rapids, September 23. It will be no ordinary presentation, however, because of the tremendous state and national interest generated by the survey. To insure a fitting degree of publicity for occasion, all state medical societies and all state and national insurance companies will be invited to have a representative present; invitations have also gone out to leading writers on science.

An important part of treatment of a disease is adequate diagnosis, based on meticulous fact-finding. The same scientific principle has here been applied to ascertaining what can be improved in medical insurance protection. While diagnosis does not insure cure (i.e. giving everyone everything they want in a medical-surgical program) at least the facts will henceforth be available, for the people have had a chance to speak out.

Our thanks are extended to Hugh Brenneman, Public Relations Counsel and Director of the Study, of the Michigan State Medical Society, for the facts on which this notice is based.

Book Review Engraved On The Head of a Pin

Though it is obviously absurd to attempt to review two volumes of tomes of the scope of the present works* in the space at our disposal, we shall proceed to do so, keeping in mind that there have been assiduous workmen who actually engraved the entire Lord's Prayer on the heads of pins. These two works, or rather two parts of a continuous study, take up almost twenty-one hundred pages in quarto format; they are based upon the most thorough-going statistics possible, and they cover every topic of economic interest from the geographical facts of the world's surface, in the first chapter, to a long study of the United Nations and its operations in the last chapter of the second volume. This two-part global stocktaking was financed jointly by the Twentieth Century Fund and the Rockfeller Foundation, and is the exclusive work of a husband and wife team, W.S. and E.S. Woytinsky. It should be noted that they are not editors or directors of a collective project with a large stable of technical writers and statisticians to draw upon: these two alone have done the entire monumental task.

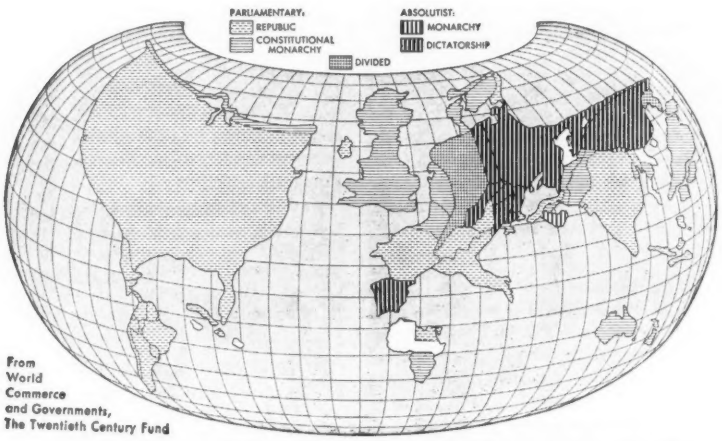
World Population and Production was published in 1953; *World Commerce and Government* in 1955. Naturally the statistical charts, tables and illustrations (over eleven hundred, exclusive of short lists in the text) are the latest obtainable, yet they point out one of the deficiencies still existing in the science of statistics. To take one case in point: it is hard to make valid comparisons over a wide area where statistics are not compiled uniformly, or where it may not be possible to ascertain the principle guiding the compilation in all instances. A random example is Table 86 of the first volume: Annual Average Infant Mortality Rates. The table begins with 1871, but from that year to 1911 there are no figures for the United States, whereas the figures for Russia run from 1871 to 1910, then stop. The twenty-one countries represented in the table can be compared, but not all countries for all years, because of the limitations of the statistical coverage.

A main deficiency (if it may be called a deficiency) of such a book is clearly recognized by the authors. A section of the general Introduction has to do with the impossibility of correlating economic information from the USSR with that from the free world. They note:

> The United Nations and its specialized agencies have made serious attempts to develop modern statistical reporting throughout the world and to increase the comparability of national statistics. The Kremlin has met these efforts with a resolute veto and a statistical blackout in the areas under its control. Besides boycotting the inquiries of the United Nations, the Kremlin is flooding the world with reports of its own which contravene all principles of modern statistics. These reports are usually indexes of production computed in an unknown way and related to an unknown base.
>
> There is no way to segregate truth from falsehood in these communications. . . (*World Population,* lxv)

Within the limitations of the statistical method, and those special limitations noted above (neither one the responsibility of the authors, and always clearly noted when they obscure the results sought), the books are invaluable. One hesitates to call them reference volumes, for they invite consecutive reading limited only by the time at one's disposal. I do not believe that any reader with an economic bias could stop reading the 150-page section on Transportation (in *World Commerce*) before he finishes it. It contains, for one thing, an adequate history of the steam locomotive from 1804 to the present: national develop-

*W. S. and E. S. Woytinsky, *World Population and Production* (New York: The Twentieth Century Fund, 1953); and *World Commerce and Government* (1955). Combination price: $20.



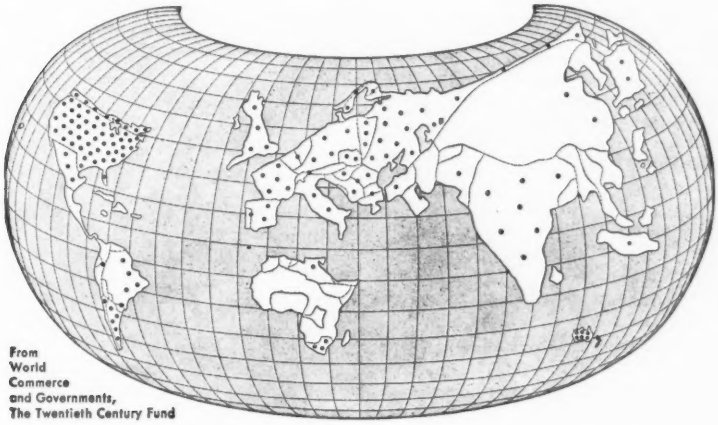
TYPES OF GOVERNMENT WITH A COMPARISON OF THEIR INCOMES

Distorted world map showing independent countries drawn with areas proportional to national income around 1950 and classified by types of government.

ments, comparative tables of length of line in different years, of railroad equipment, types of locomotives, and electrically operated lines. Students of government, agriculture and public health will find similar coverage of their fields.

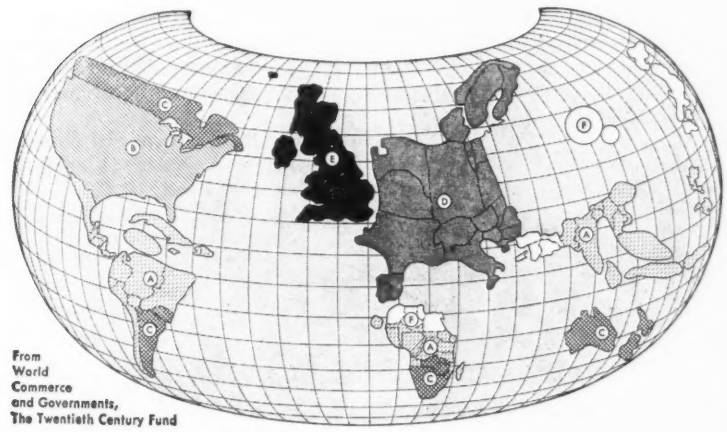
Symbolic of the great scope and at the same time the unifying principle of this monumental work is the fact that it begins and ends with the world as a whole: physical geography and ethnic distribution take up the first part of the first volume; after detailed study of many aspects of communal life throughout the world, the second volume closes with a long section on governments, culminating, appropriately enough, in a protracted section on International Cooperation in the form of the UN, NATO, and the European Payments Union. The implication is that we are one world physically, and had better become one economically. The volume ends in a guarded forecast of the various economic factors that can boost the entire world out of poverty—and the explicit statement that future projections will be gloomy, indeed, if war figures in the picture.

One of the most interesting aspects of the present study is the type of map that is generally used when it is necessary to show the entire world in the flat. As is generally known, any attempt to show the world two-dimensionally results in distortion, and the features adjudged most important to be portrayed accurately determine the type of distortion chosen (e.g: Mercator's projection gives the least distortion for purposes of North Atlantic navigation; hence its long-standing popularity, and the assumption of the uninformed that it is not distorted at all). The authors found that the projection of Dr. Erwin Raisz best met the global needs of their study. Dr. Raisz described his map as the "armadillo projection", as its shape is like that of an armadillo's armor. Its main distortions are in the regions of the Poles and the Pacific Ocean, while the world's land masses are shown with a high degree of accuracy and the dramatic fact of their confrontation across the Atlantic Ocean. Examples of the maps accompany this article, and illustrate both Dr. Raisz's technique and the great scope of the study.



RAILROAD TRANSPORTATION THROUGHOUT THE WORLD

Distorted world map showing the density of railroad lines in the world in relation to population in 1952. Each dot represents 5,000 miles of line. Continents and countries are shown on a scale proportionate to population.



THE NATIONS OF THE WORLD ON THE SCALE OF THEIR EXPORTS

Distorted world map showing how the areas of continents and countries would look if drawn on the scale of their exports in 1952. The six regions of world trade (after Folke Hildegerdt) shown in this chart are as follows: A. Tropics; B. United States; C. Regions of recent settlement; D. Continental Europe; E. Noncontinental Europe; F. Rest of the world.

In this reviewer's opinion, the two volumes are indispensable reference material for any business man, writer or student of international affairs. To designate them as reference material is misleading, however, for they form continuous reading matter of peculiar fascination. Our world is a little more our own by virtue of our understanding it, and such books as these vastly enlarge the area of our understanding. *A.C.G.*

AUTOMATION IN 1496

Leonardo da Vinci, best known as the painter of the famous *Mona Lisa,* was also one of the greatest mechanical geniuses in history. Though most of his projects were never carried through, he designed submarines, airplanes, siege engines and many other machines. His fascinating notebook describes some of these projects, illustrated by minute and accurate drawings. To protect himself from charges of witchcraft, he wrote his notes backwards and left-handed, so that they had to be deciphered by means of a mirror. The following statement accompanies the drawings for a machine for sharpening needles, probably the first mass-production device on such a scale. Leonardo, like many later inventors, is counting up his possible profits before the chickens are hatched: it is not known that the machine was ever built.

> 100 times an hour and 400 needles every time. That means 40,000 needles per hour, and 480,000 in twelve hours. Let us say 4,000,000 would bring in 20,000 soldi at 5 soldi per 1,000. That is a total of 1,000 lire for every working day and with twenty working days every month it would be 60,000 ducats a year.
>
> *Selections from the Notebooks of Leonardo da Vinci,* tr. Irma A. Richter (London: the Oxford University Press, 1952).

SO YOU CALL YOURSELF A FISHERMAN

Do you really know the facts about your favorite hobby? Economically speaking, what is the most important fish caught in the Western Hemisphere, and do you think you would like it for lunch? Astound your friends by informing them about the lowly menhaden, which constitutes the largest commercial catch, and which you wouldn't dream of eating. Your poultry enjoy it mixed in their feed, but they may be getting less of it for a while, as the catch is down 50% in the last year. Try to get them interested in chickweed and left-over breakfast food.